**SCH3U1**

**Name:** Teacher
**Date:** May 17th

**Solutions Quiz** (Chapter 6/7)

| K/U | /10 | A | /20 |
|---|---|---|---|

**Part B: Short Answer (20 marks)**
Answer the questions in the space provided.

1. TSP is an all purpose cleaner that can be used to clean driveways. What volume of solution would you get if you dissolved 150.0 g of sodium phosphate in water to produce a 0.23 mol/L solution?(5 marks)

$M = 150.0\,g$, $M_{Na_3PO_4} = 163.94\,mol/L$ ①

$n = 150.0\,g \times \frac{1\,mol}{163.94\,g}$ ②

$= m/M = 0.915\,mol$ ③

$C = \frac{n}{V} \Rightarrow V = \frac{n}{C}$ ④ $= \frac{0.915\,mol}{0.23\,mol/L} = 3.98\,L$

$= 4.0\,L$ ⑤

2. How much water must be added to 200mL of a 2.40 mol/L $NH_{3(aq)}$ cleaning solution to make the concentration of the resulting solution 0.48 mol/L?

$C_1 = 2.40\,mol/L$ $C_2 = 0.48\,mol/L$

$V_1 = 200\,mL$ ? $V_2$ → then added V

① $C_1V_1 = C_2V_2$

$V_2 = \frac{C_1V_1}{C_2}$

$= \frac{(2.40\,mol/L)(200\,mL)}{0.48\,mol/L}$ ②

$= 1000\,mL$ ③

Volume that needs to be added =

$V_2 - V_1 = 1000\,mL - 200\,mL = 800\,mL$ ④

-0.5 S.F.

3. Calculate the volume of 0.0250 mol/L calcium hydroxide solution that can be completely reacted with 25.0 mL of 0.125 mol/L aluminum sulfate solution. (6 marks)

$3Ca(OH)_2(aq) + 1Al_2(SO_4)_3(aq) \rightarrow 3CaSO_4(s) + 2Al(OH)_3(s)$ ①

$Ca(OH)_2$: ? (V), 0.0250 mol/L (C)

$Al_2(SO_4)_3$: 25.0 mL = 0.025 L, 0.125 mol/L

$n_{Al_2(SO_4)_3} = C \times V$ ②

$= (0.025\,0\,L)(0.125\,mol/L)$

$= 3.125 \times 10^{-3}\ mol\ Al_2(SO_4)_3$ ③

$n_{Ca(OH)_2} = 3.125 \times 10^{-3}\ mol\ Al_2(SO_4)_3 \times \frac{3\ mol\ Ca(OH)_2}{1\ mol\ Al_2(SO_4)_3} = 9.375 \times 10^{-3}\ mol\ Ca(OH)_2$ ④

$V_{Ca(OH)_2} = \frac{n}{C}$ ⑤ $= \frac{9.375 \times 10^{-3}\ mol}{0.0250\ mol/L} = 0.375\ L$

$= 0.375\,L$ ⑥

4. An aqueous solution of sodium phosphate mixes with an aqueous solution of lead (II) nitrate. Write the balanced chemical equation, the total ionic equation, and the net ionic equation for this reaction. (6 marks-2 marks for each equation)

B.C: $2Na_3PO_4(aq) + 3Pb(NO_3)_2(aq) \rightarrow 6NaNO_3(aq) + Pb_3(PO_4)_2(s)$ ②

I: $6Na^+(aq) + 2PO_4^{3-}(aq) + 3Pb^{+2}(aq) + 6NO_3^-(aq) \rightarrow 6Na^+(aq) + 6NO_3^-(aq) + Pb_3(PO_4)_2(s)$ ②

N.I. $3Pb^{+2}(aq) + 2PO_4^{3-}(aq) \rightarrow Pb_3(PO_4)_2(s)$ ②